



AMSAT

TM

Affiliated with



NEWSLETTER

Issued quarterly by the Radio Amateur Satellite Corporation

Price 50¢

Volume V

Number 3

September 1973

AMSAT OFFICERS

President:

Perry I. Klein K3JTE

Executive V.P.:

Jan A. King W3GEY

V.P. Engineering:

George Kinal WA3TRL

V.P. Operations:

William A. Tynen W3KMV

Secretary:

Charles Dorian W3JPT

Treasurer:

William A. Hook W3QBC

Editor:

Thomas H. Mitchell

WA3TBD

Contents

Editorial.....	2
From the President's Desk...AMSAT 1973 Annual Report....	2
AMSAT Board of Directors Meeting.....	5
Amateur Satellite Service Committee Meeting.....	6
OSCAR Educational Program.....	8
AMSAT Financial Report.....	9
ARRL Technical Symposium...Space Communications.....	12
Proposal for Transmitting Physiological Data Via OSCAR 6.....	13
Computer Printouts for Tracking Azimuth-Elevation Available.....	14
OSCAR 6 Orbits...September through December.....	16
Letters.....	17
Special Announcement...Re-Naming of OSCAR 6.....	20
SPECIAL CENTER SECTION...New Membership Renewal Policy and Membership Application Form.....Center Section	

Material published in the AMSAT Newsletter may be reproduced without specific permission provided credit is given to the source.

AMSAT
P.O. Box 27
Washington, D.C. 20044



FIRST CLASS
U.S. POSTAGE
PAID 8c
Permit No. 44367

FIRST CLASS

EDITORIAL -- ARRL Technical Symposium

by Tom Mitchell, WA3TBD

By now, everyone concerned -- and everyone SHOULD be concerned -- no doubt knows about the ARRL Technical Symposium on Space Communications, September 14, which will occur in conjunction with the Roanoke Division Convention, September 14-16. We urge everyone who possibly can to attend. Details have appeared in QST and on page 5 of the June Newsletter, as well as further details in this issue.

If you still have that center section in your copy of the June Newsletter, you shouldn't have -- the other side is a ballot for the four positions on the Board of Directors which will be falling vacant. If you haven't done so, mail your ballot IMMEDIATELY, as ballots will be counted at the AMSAT annual meeting, September 15, 1973.

Besides the election, the agenda is to include the AMSAT Annual Report and OSCAR 6 and 7 Progress Reports.

We especially urge members to attend this meeting along with the other activities being held in conjunction with it. As we hope you have already mailed in your ballot, you may need the following information repeated: The AMSAT Annual Meeting and Forum is scheduled from 11:00 a.m. to 1:00 p.m. at the Sheraton Inn and International Convention Center, Reston, Virginia (about 20 miles west of Washington, D.C.).

FROM THE PRESIDENT'S DESK

by Perry Klein, K3JTE

AMSAT 1973 Annual Report

AMSAT, the Radio Amateur Satellite Corporation, was established in 1969 to provide amateur satellites and satellite experiments for the Amateur Satellite Service. The purposes and objectives of the corporation, as given in the Bylaws are:

A. To provide satellites that can be used for amateur radio communication and experimentation by suitably equipped amateur radio stations throughout the world on a non-discriminatory basis.

B. To encourage development of skills and the advancement of specialized knowledge in the art and practice of amateur radio communications and space science.

C. To foster international goodwill and cooperation through joint experimentation and study, and through the wide participation in these activities on a noncommercial basis by radio amateurs of the world.

D. To facilitate communications by means of amateur satellites in times of emergency.

E. To encourage the more effective and expanded use of the higher frequency amateur bands.

F. To disseminate scientific, technical and operational information derived from such communications and experimentation, and to encourage publication of such information in treatises, theses, trade publications, technical journals or other public media.

Membership in AMSAT is open to all radio amateurs and other interested persons. AMSAT encourages the participation of all interested individuals in its activities and invites licensed amateur radio operators of all countries to engage in radio transmissions to the satellites. Membership is international, and currently totals over 954 members and 60 member societies in 46 countries, representing a growth in membership of 47 percent since the OSCAR 6 launch in October 1972.

Accomplishments for the Year 1973

The most significant accomplishment during 1973 was the continued successful operation of OSCAR 6, launched on October 15, 1972. With the exception of a drastic drop in output of the 435.1 MHz beacon since January 10, 1973, and the loss of output from one of the six solar panels, the spacecraft has continued to work well. A problem of transient switching of the satellite's functions, including the intermittent switching of the two-to-ten meter repeater on and off, continues to be present but has been largely overcome, at least in some parts of the world, by the intensive use of ground control stations. After some months of preparation, command stations in Canada, Australia, New Zealand, Germany and the United States are now reportedly prepared to provide the degree of control necessary to maintain the satellite in its desired operating mode.

During the year, under a contract from AMSAT, curriculum material for the use of OSCAR in classroom instruction was prepared by the Talcott Mountain Science Center in Avon, Connecticut, for distribution to schools. This work has now been completed, and one class unit has already been distributed to educators throughout the United States. The American Radio Relay League has assumed the responsibility for administering the amateur satellite education program, and will also be assisting in the publicity and international aspects of amateur satellite activities.

In March 1973, a series of demonstrations of the use of OSCAR terminals in classrooms was conducted in Little Rock, Arkansas, as part of a NASA Community Involvement Program.

OSCAR 6, in its first ten months of operation has been used by approximately 1400 amateur stations, nearly half of them in the United States. Approximately half of the 1400 stations on the official AMSAT "OSCAR 6 Users List" have been confirmed by QSL's or written reports from these stations. The other half were compiled from two-way QSO's reported on OSCAR 6 communication report forms received by AMSAT. (Reports of stations heard rather than worked are not included in this compilation.) It appears from incoming reports that between 100 and 200 new stations are coming onto the satellite with each passing month, but that some of the original stations are no longer using OSCAR 6. As of early August, the ten countries with the largest number of users of OSCAR 6 were Germany (126 users), England (83), Japan (72), France (63), Australia (51), Canada (46), New Zealand (39), Sweden (35), USSR (23), and the United States (around 640). These countries represent about 85% of the calls of stations reported using the satellite. Stations in 64 countries have been operating successfully, and amateurs in at least five other countries are known to be preparing for operation.

Among the interesting and unusual operation reported with OSCAR 6 are dx-peditions by FP8AA, PJ7VL, PJ9JT and ZK1TA, automobile operation by W2GN, G3IOR and JALVDV, and aeronautical mobile operation by W6OAL. OZ7DX reports preparing for maritime mobile operation from the "Dana," a Danish research vessel. RTTY operation has been reported by VK3YDB, G3CUO, W6OAL and WA3EWJ. W9NTP, WA9UHV and SM6OH all reportedly have been active on slow-scan television, and WA6GUY reports successful facsimile transmission to WA3FVG/6 via the satellite. In addition, SSTV and audio tone ranging tests have been conducted by DJ4ZC, who uses the data for satellite orbit determination. Finally, all fifty U.S. states have been worked and confirmed by W3TMZ, who qualifies for the first OSCAR Worked All States award.

Current Activity

In support of OSCAR 6 operating activities, a number of AMSAT nets have been established throughout the world. These include the international AMSAT nets meeting Sundays at 1800 GMT (14,280 kHz) and 1900 GMT (21,280 kHz), the North America East Coast AMSAT Net meeting Mondays at 9 pm EDT (May through October) and 7 PM EST (November through April) on 3855 kHz, the North America West Coast AMSAT Net on Mondays at 8 PM PDT (3850 kHz), a European net on Sundays at 0930 GMT (7070 kHz), another European net after passes on ON days (3780 kHz), and other nets on 75 meters in Japan and New Zealand. These nets have proved an excellent means of communicating changes in the OSCAR 6 operating schedule, coordinating special satellite activities and experiments, as well as providing a forum for satellite users to compare notes on their operating activities.

The OSCAR orbital predictions generated by several different groups throughout the world have proved generally quite good. Using data provided by NASA, it was found possible after the initial two to three months of tracking experience to determine OSCAR's orbital period with an accuracy of ± 0.0001 minute, corresponding to an error of ± 0.1 minute after 80 days. Orbital predictions provided for WIAW bulletins, for example, are now generated for five to six-month periods and maintain an accuracy of better than ± 1 minute.

In addition to the nets already mentioned and information relayed by bulletin stations, AMSAT maintains a telephone "hotline" (now at a new number in the Washington, D.C. area: 703-938-5678). Weekly recorded bulletins on the orbit and other information can be obtained by calling this number.

Turning now to other current activity, AMSAT's Board of Directors on June 30 authorized an acceleration of the AMSAT-OSCAR-B satellite project for completion in time for launch during the first quarter of 1974, and authorized additional expenditures (estimated at between \$38,000 and \$40,000) for the project. The required additional funding, which covers the salaries of two engineers and two aerospace technicians employed full-time by AMSAT, as well as funds for needed space-qualified components and ground support test equipment, is covered entirely by special funds provided by ARRL and individuals who have designated their donations specifically for the purpose of completing the A-O-B spacecraft as rapidly as possible. General membership dues and general donations are not being used to pay salaries.

Assisting with A-O-B development are several groups in addition to the Washington-area AMSAT members. These include the newly-incorporated AMSAT Deutschland e.V., AMSAT's affiliate in Marburg, Germany (under the leadership of Dr. Karl Meinzer, DJ4ZC and Werner Haas, DJ5KQ), WIA-Project Australis in Melbourne, Australia (particularly Dr. Peter Hammer, VK3ZPI), the Jet Propulsion Laboratory Amateur Radio Club and San Bernardino Microwave Society in southern California, and a group headed by Larry Kayser, VE3QB in Canada. Other individual AMSAT members in other locations are also involved. For example, John Goode, W5CAY, is constructing another Codestore unit.

Future Activity

AMSAT's activity during the coming year is expected to continue to focus on the OSCAR 6 and A-O-B satellite projects. Concurrently with this activity, AMSAT is exploring with WIA-Project Australis and AMSAT Deutschland, the development of new satellites to be constructed by these groups using some AMSAT-provided A-O-B series hardware, along with new communications repeater experiments. Additional projects showing excellent progress toward use for future OSCAR satellites include a new spaceframe structure under development by Project OSCAR, Inc. in California, and 144-to-435 MHz linear repeaters under development in Germany and Australia.

In addition to technical activities, efforts are now underway to secure funds for continued AMSAT projects, directed not only toward providing more advanced satellites of the A-O-B series, but also toward developing the capability of building AMSAT payloads for synchronous, near-synchronous and synchronous-transfer orbits. The funding for these projects, estimated to require nearly \$100,000 per year, will necessitate additional donations from individuals, as well as contributions from other sources. Assisting with the fund-raising efforts will be the new ARRL Foundation recently established by the League Board of Directors. One of the first functions of this foundation will be to obtain donations for satellite projects. The directions future AMSAT projects take, and the overall level of amateur satellite activity in the years to come will be dependent upon the degree of financial support obtained by the new foundation.

AMSAT Board of Directors Meeting

June 30, 1973

The meeting was called to order by President Klein at 10:50 AM at his home.

In attendance were Perry Klein K3JTE, Jan King W3GEY, Bill Tynan W3KMY, Chas. Dorian W3JPT, Ray Soifer K2QHW, Bill Dunkerley WA2INB, Dick Daniels WA4DGU, Phil Sager WB4FDT and Marc Pressman WB4DRB.

The first order of business was to approve the appointment of Phil Sager WB4FDT as Corresponding Secretary replacing a role largely provided by Joe Gatti W4TRJ and Ollie DeZoute WB4EVT during the past 3 years. A vote of appreciation was expressed to Joe for his efforts in behalf of amateur satellites. Recognition was also given to his able assistants Ollie DeZoute WB4EVT and more recently Jack Farrance W3EIM.

Charles Dorian reported on the plans for the AMSAT Annual Meeting and Amateur Satellite Forum which will be held in conjunction with the ARRL Roanoke Division Amateur Radio Convention on September 15, 1973 in Reston, Va. Everything is proceeding well and the AMSAT Forum and Annual Meeting will be from 1100 to 1300 on the 15th. A report was also made on the planned ARRL Technical Symposium to be held on the afternoon and evening of September 14th, just preceding the Convention. The theme of the Symposium is "Space Communications." A total of 10 to 12 papers will be presented and some AMSAT members will be authors of the papers.

The next subject considered was the possibility of converting all membership renewals to 1 January rather than the present 6 dates - every other month. It was agreed a shift to a single date was preferable and approval was given for Treasurer Bill Hook to work out the details and place the conversion into action.

The possibility of Life Membership was raised and it was agreed to solicit the views of the membership on this subject.

Jan King reported on his recent trip to Germany including the two weeks spent on AMSAT business for which \$200 was authorized as partial travel expenses. Jan advised on the latest developments on satellite construction, reducing 2 meter beacon interference. There are 15 beacons in operation which are expected to be shifted. A letter will be written to the Bochum Command Station acknowledging his assistance with the European command task.

Approval was given to the designation as a Command Station of DL3YBA for OSCAR 6 and to VE3QB for OSCAR 7. Approval was also given for the purchase of a 144 MHz transmitter for use in the Washington area as a back-up Command Station.

Jan outlined the background and function of a cooperative AMSAT organization in Germany known as AMSAT Deutschland e.V. Approval was given for its support in the development of OSCAR 7 hardware and an expenditure of \$880 was granted for support of the work. This support would be partial with the remaining funds to come from other sources. It was agreed that there should be a periodic statement accounting for the money.

Considerable discussion was given to the efforts to prepare and launch A-O-B (OSCAR 7). The Board approved an accelerated effort and budget to provide an A-O-B type satellite for medium-altitude polar orbit, with a target hardware completion date of January 1974, to take advantage of the first suitable launch opportunity in the first quarter of 1974. Mr. King wished to go on record as stating that the time frame of this development effort is unreasonable.

The Board voted to employ a full-time President, commencing on July 2nd, contingent upon receipt of available funds during the month of July, and have delegated to him the authority, under the general direction of the Board, to employ such personnel as may be necessary for implementation of the accelerated A-O-B construction and test program. It was the sense of the Board not to employ Directors in salaried positions.

The meeting was adjourned at 7:00 PM.

Charles Dorian, W3JPT
and
Raphael Soifer, K2QBW

MINUTES OF AMATEUR SATELLITE SERVICE COMMITTEE MEETING

June 17, 1973
Reston, Virginia

A meeting of the Amateur Satellite Service Committee was called to order at 9:20 a.m. on June 17, 1973, at the Dulles Marriott Hotel, Reston, Virginia. Those present were:

*William Eitel, W6UF (Chairman)	*Ray Vincent, WA6CBX, OSCAR
*Harry Dannals, W2TUK, ARRL	*Richard Daniels, WA4DGU, AMSAT
*Perry Klein, K3JTE, AMSAT	*V. C. Clark, W4KFC, ARRL
Charles Compton, W8BUO, ARRL	Herbert Hoover, III, W6APW, OSCAR
Jan King, W3GEY, AMSAT	John Huntoon, W1RW, ARRL
Robert Booth, Jr., W3PS, ARRL	William Dunkerley, WA2INB, AMSAT

*Members, ASSC.

AMSAT Report. Perry Klein related achievements with OSCAR 6, still operating effectively -- 50 states and 1100 separate calls have used the satellite; 100 have qualified for the Satellite 1000 Award. Automated ground commands have overcome spurious turn-on/off and OSCAR 6 is expected to reach one year life-time goal in October. Jan King visited DJ4ZC and others recently and obtained full cooperation in protection from interference to OSCAR 6 uplink channel and OSCAR 7 downlink, probably by moving the German and Swedish beacons from those frequencies. Further coordination is being accomplished through IARU.

OSCAR Report. Ray Vincent reviewed progress on spaceframe design and presented both drawings and construction samples for committee inspection. The plan is to build six or eight units in the first run, subject to availability of materials; there will be 20 large and 20 small modules, as well as two battery compartments. The design has been coordinated with AMSAT for use after Oscar 7,

and meets space standards as well as EMI shielding requirements, with approved components and hardware throughout. The design is adaptable both to NASA and USAF vehicle requirements, since OSCAR sees many future possibilities for launch from the west coast, and believes it highly important to be ready for sudden "standby" opportunities.

ARRL Report. Harry Dannals stated that 2,000 copies of "Member's Guide to Amateur Satellites," reprints of selected articles from QST and the AMSAT Newsletter, had been printed and were being distributed. A similar quantity of an educator's preview of "Space Science Involvement," an interim curriculum for classroom work, was in distribution to affiliated clubs with educational institutions, and through the Talcott Mountain Science Center to about 250 science department chairmen in Connecticut schools. There is a response rate of about 10% from those seeking more information. Bill Dunkerley and ARRL Public Relations Consultant Don Waters went to Little Rock, Arkansas, in April in conjunction with a 3-week NASA spacemobile educational project in that city. Oscar lectures and actual demonstrations were presented to several school groups and civic organizations, with student response good. The test project indicated that local amateurs, who were of considerable assistance in making arrangements and assisting in the presentations, likely could be relied on for similar presentations in other cities to be visited by the spacemobiles. As to the Talcott Mountain Science Center curriculum assignment, the preparation is nearly complete and the final submission should be accomplished within a few weeks.

Space Foundation. Harry Dannals described the situation as concerns the possibility of ARRL involvement in a satellite foundation to fund amateur space communications efforts, pointing out that the ARRL Management & Finance Committee was currently studying the possibility of a general "foundation" to receive contributions, and the Plans & Programs Committee was currently studying the possibility of obtaining grants from major national foundations (such as Ford). He stated that any proposal to establish an "ARRL Satellite Foundation" must primarily be acceptable to the Board of Directors, and encompass benefits both to amateur radio and the League. He stated that Messrs. Compton, Booth, Clark, Huntoon and himself had discussed the general subject extensively and concluded that the following "areas of agreement" would be a suitable basis for recommendation to the ARRL Board:

That a fund raising and disbursing organization is required to support future satellite projects conducted by radio amateur groups.

That, for continuity of administrative support and to enhance its credibility, this organization should be identified with ARRL, preferably as a satellite foundation.

That ARRL officials should have a controlling influence in the affairs of the foundation.

That the foundation should be limited, at least for the present, to the securing and disbursing of funds to assure continuation of amateur radio space activities.

That any monetary advance to AMSAT authorized by the ARRL Board of Directors at its July 1973 meeting will constitute the first indebtedness of the fund-raising foundation.

Foundation personnel in key positions would be entirely volunteers. Ray Vincent pointed out, and the group concurred in, the need to involve and utilize at appropriate levels experts in the electronics, aerospace and fiscal communities to implement the aims of such a foundation. It was agreed that inclusion of the ARRL name in the foundation title was not mandatory but highly desirable, so that the League would be the sponsoring organization and provide administrative

support. As concerns the term "management and control" earlier proposed by OSCAR, those present agreed that fiscal control is what is intended. The group discussed advantages and disadvantages of a general versus a specialized foundation, with the conclusion that a specialized satellite foundation would offer a greater probability of attracting donors; such a foundation could expand to other purposes at a later date if the need arises. IRS clearance would require an estimated three months.

AMSAT Financial Status. Perry Klein reported that work was reasonably well along in design and construction of AO-7, which will be a sophisticated OSCAR 6, duplicating the 2-meter up/10-meter down repeater, with an additional 432-up/146-down German-built repeater, plus other features such as an Australian-designed command system for redundancy. General administrative tasks and operating control and supervision over OSCAR 6 consume much of AMSAT personnel time at present, and AO-7 normally would be one to three years in the future. However, recognizing the strong desirability of continuity in the amateur space program--i.e., after OSCAR 6 likely dies out later in the year--an accelerated schedule could produce OSCAR 7 perhaps by January, but this would require full-time engineering management and technical development. Promising launch opportunities are available about that time, and this would avoid a gap between AO-6 and AO-7 during which momentum gained so far in the educational program in schools would be sacrificed. A tentative budget was presented indicating the need for assistance in the amount of \$38,691 to fund such an accelerated project. This was stated to be a maximum, with the possibility of reduction thru advance donations; matching funds; simplification of the package; or contribution of expensive components. Under such an arrangement AMSAT would provide periodic status reports and funding requests, and would continue through February 1974 by using its own funds for the last two months.

Bill Eitel indicated he would confirm in writing his acquiescence to ARRL use of funds donated by him to apply to financing this accelerated program if the ARRL Board elects to do so.

The Committee set its next meeting tentatively for the September 14-16 period to coincide with the Space Symposium and Roanoke Division Convention in Reston.

The Committee adjourned at 3:00 p.m.

Respectfully submitted,
V. C. Clark, Secretary
W4KFC

OSCAR EDUCATIONAL PROGRAM

OSCAR represents a unique opportunity for the amateur service to dramatically illustrate its ability to provide experiences on the cutting edge of technology. And, as we're finding out, radio amateurs need not be the only ones to profit from this involvement. ARRL has embarked upon a joint project with NASA to encourage school use of amateur satellites for classroom demonstrations. Already, teachers in Freehold, New Jersey, Mansfield, Illinois, Russellville, Arkansas, Hartford, Connecticut, Santa Cruz, California, Hollywood, Florida, Redlands, California, Denver, Colorado, Juneau, Alaska, and Braunschweig, Germany, have designed classroom activities and projects involving OSCAR.

To assist these and similar efforts, a complete curriculum supplement developed by educators at the Talcott Mountain Science Center is in final preparation. It will assist educator and radio amateur alike in the preparation of classroom OSCAR activities. A preview edition of the supplement entitled "Space Science Involvement," is already available to interested AMSAT members. To get yours, write to Bill Dunkerley, ARRL, 225 Main St., Newington, CT 06111.

With the start of the new school year, much more educational activity involving OSCAR 6 and later OSCAR 7, is expected.

AMSAT FINANCIAL REPORT

By William A. Hook, W3QBC

Statement of Receipts and Expenses

January 1 to June 30, 1973

Net Worth January 1, 1973 \$ 17,948.89

Receipts:

Dues (Note 1)	\$ 2,401.36	
Donations (Note 2)	6,104.98	
Interest	320.45	
Refunds	314.75	
Total		\$ 9,141.54

Expenses:

Office Supplies	\$ 108.70	
Postage, telephone and telegraph	1,725.22	
Printing	1,125.95	
Typing	228.70	
Travel	906.10	
Salaries & FICA tax (Note 3)	5,516.86	
Components	824.89	
Fees and Miscellaneous	150.25	
		\$ 10,586.67

Excess of Expenses over Receipts \$ 1,445.13

Net Worth June 30, 1973 \$ 16,503.76

Notes to Financial Statement

Note 1: Dues received from: Individuals, \$2,195.27; Family Memberships, \$56.00; and Member Societies, \$150.09.

Note 2: Donations included: \$4,523.64 from the American Radio Relay League; \$1,017.00 from individuals; \$464.34 from the International Amateur Radio Union, Region 1; and \$100.00 from the Ottawa (Canada) Amateur Radio Club.

Note 3: Salaries and 5.85% Social Security tax for AMSAT technicians.

MEMBERSHIP REPORT

	<u>Nov. 1, 1972</u>	<u>Aug. 1, 1973</u>	<u>Increase</u>
Individual and Family	640	954	314
Member Societies	52	60	8
Totals	692	1014	322 (47%)

LIFE MEMBERSHIP

Now that AMSAT will soon be five years old, it has been proposed that an AMSAT Life Membership be established for persons contributing above a certain amount (perhaps \$100). If you think you might be interested in becoming an AMSAT Life Member, please indicate this in the space provided at the bottom of the tear-out sheet bound into the center of this newsletter.

46 Countries Represented

Angola	Greece	Philippines
Argentina	Guam	Puerto Rico
Australia	Hong Kong	Republic of South Africa
Austria	Hungary	Rhodesia
Belgium	Iceland	Scotland
Brazil	India	Spain
Bulgaria	Iran	Sri Lanka
Canada	Israel	Surinam
Chile	Italy	Sweden
Colombia	Japan	Switzerland
Czechoslovakia	Kenya	Thailand
Denmark	Malaysia	Uruguay
England	Marshall Islands	United States
Finland	Mexico	Venezuela
France	Netherlands	
Germany	New Zealand	

AMSAT Member Societies

Dayton Amateur Radio Association Dayton, Ohio	Talcott Mtn. UHF Society Talcott Mtn. Science Center Avon, Connecticut
COMSAT Amateur Radio Club Clarksburg, Maryland	Johns Hopkins APL Radio Club Silver Spring, Maryland
Goddard Amateur Radio Club Greenbelt, Maryland	ARINC Amateur Radio Club Annapolis, Maryland
USCG Amateur Radio Club Alexandria, Virginia	Central States VHF Society Boulder, Colorado
Radio Society of Sri Lanka Colombo, SRI LANKA	Swedish Amateur Radio Society Enskede, SWEDEN
Union Schweizerischer Kurzwellen- Amateure Seegraben, SWITZERLAND	Radio Club Argentino Buenos Aires, ARGENTINA
Radio Society of Great Britain London, ENGLAND	Natl. Insts. Health Radio Amateur Club Bethesda, Maryland
VE2RM Incorporated Pointe Claire, Dorval P. Q., CANADA	Philippine Amateur Radio Assn. Manila, PHILIPPINES
Sun City Amateur Radio Club, Inc. El Paso, Texas	Rome Radio Club, Inc. Rome, New York
Montreal Amateur Radio Club, Inc. Westmont P. Q., CANADA	Verband der Funkamateure der Deutschen Bundpost Bamberg, WEST GERMANY
Hampden County Radio Assn. Southwick, Massachusetts	JPL Amateur Radio Club Pasadena, California
Deutscher Amateur Radio Club Kiel, GERMANY	Kokomo Firebird Radio Club Kokomo, Indiana
Mt. Airy VHF Radio Club Elkins Park, Pennsylvania	Huntsville Amateur Radio Club Huntsville, Alabama

Two Meter Association Tokyo, JAPAN	OK7ULZ VHF Group Praha, CZECHOSLOVAKIA
Central Mass. Amateur Radio Assn. Spencer, Massachusetts	IBM Amateur Radio Assn. Gaithersburg, Maryland
Ottawa Amateur Radio Club Ontario, CANADA	Wireless Institute of Australia Brisbane, Queensland AUSTRALIA
Battelle Columbus Radio Club Columbus, Ohio	Christchurch VHF Group Christchurch, NEW ZEALAND
Northstar Highbanders Amateur Radio Club Minneapolis, Minnesota	Tidewater Amateur Radio Club Norfolk, Virginia
Lakehead University Amateur Radio Club Lakehead University Thunder Bay, Ontario, CANADA	Newport County Radio Club Newport, Rhode Island
Chicago Suburban Radio Club Brookfield, Illinois	The New Zealand Association of Radio Transmitters, Inc. Christchurch, NEW ZEALAND
Southern Illinois University Amateur Radio Club Edwardsville, Illinois	Radio Oscar Club Parma Parma, ITALY
Department of State Amateur Radio Club Washington, D. C.	Liga Mexicana De Radioexperimentadores A. C. Mexico D. F., MEXICO
Conejos Valley Amateur Radio Club Thousand Oaks, California	Ambassador College Satellite Stn. Herts, ENGLAND
MIT Radio Society Cambridge, Massachusetts	Goldcoast Radio Club Southport, Queensland, AUSTRALIA
Montgomery Amateur Radio Club Gaithersburg, Maryland	Rock Creek Amateur Radio Assn. Chevy Chase, Maryland
Huron Valley Amateur Radio Club Ypsilanti, Michigan	Carone Philippe Radio Club Rouen, FRANCE
Akademisk Radioklubb Trondheim, NORWAY	Volkssternwarte Clubstn. Bochum, Sundern, WEST GERMANY
Roanoke Valley Amateur Radio Club, Inc. Roanoke, Virginia	San Bernardino Microwave Society, Inc. Corona, California
East Lancashire Amateur Radio Club Clitheroe, Lancashire, ENGLAND	Mike and Key Radio Club of Seattle Tacoma, Washington
Opportunity School Amateur Radio Club Denver, Colorado	Circulo Nacional de VHF - Santiago Santiago, CHILE

The above clubs and associations are listed in the order of joining AMSAT.

ARRL
Technical Symposium
14 September 1973

2:00 - 5:00 P.M.

7:30 - 10:30 P.M.

SPACE COMMUNICATIONS

1400-1700

George Jacobs, W3ASK, Moderator

John Fox, W0LER and Ron Dunbar, W0MJS

Inverted Doppler Effect

Larry Kayser, VE3QB

System Multiplexing Amateur Radio Telecommands

Allen Katz, K2UYH

432 MHz Moonbounce Communications

Tom McMullen, W1SL

A Simple Ground Station for Amateur Satellite Work

Richard Knadle, K2RIW

21 Centimeters and Down

1930 - 2130

Ray Spence, W4QAW, Moderator

Peter E. Cleall, G8AFN

The Challenge of Oscar

Karl Meinzer, DJ4ZC and Jan King, W3GEY

Orbit Considerations for Future Oscar Satellites

Raphael Soifer, K2QBW

Frequency Planning for Amateur Satellites

Perry Klein, K3JTE

Communications Experiments for Oscar Satellites

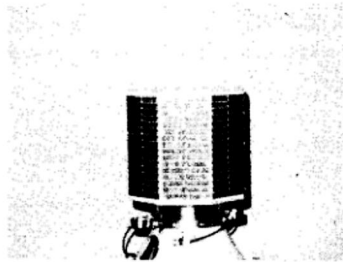
Joe Kasser, G3ZCZ and Jan King, W3GEY

Oscar 7 and its Capabilities

2130 - 2230

Panel Session

The AMSAT-OSCAR-B Spacecraft
(shown with its Marmon clamp
ejection mechanism)



A PROPOSAL FOR TRANSMITTING PHYSIOLOGICAL DATA
VIA THE OSCAR 6 SATELLITE

by A. Vilensky, 4X4MH
P. O. Box 6342, Haifa, Israel

In the last few months there have been various articles published on the applications of OSCAR 6 RTTY, SSTV and facsimile transmissions.

I would like to propose an experimental study concerning the possibility of physiological data transmission. Such a link may be important in cases of isolated situations as ships at sea or disaster areas.

As a medical engineer, I would like to propose the following experiment.

The aim: To transmit ECG data.

THE TRANSMITTING END:

1. A man is connected to electrodes.
2. An ECG preamplifier, with line and VHF filters.
3. A frequency modulator around 1800 Hz with a frequency response between 0.1 - 100 Hz connected to the output of the ECG preamplifier.
4. SSB or AM transmitter on the two-meter band modulated by the signal derived from the frequency modulator.

THE RECEIVING END:

Alternative A

1. Ten-meter AM or SSB receiver.
2. Frequency discriminator around 1800 Hz fed from the receiver.
3. A standard ECG recorder connected to the discriminator output.

Alternative B

1. Ten-meter AM or SSB receiver.
2. A phone patch connected to the receiver.
3. A telephone line linked to a medical center.
4. A frequency discriminator connected to the telephone line at the medical center.
5. Input terminal to cardiological recording equipment or analog-to-digital input for an on-line computer.

Alternative C

1. Ten-meter AM or SSB receiver.
2. A high quality audio tape recorder.
In this case data can be played back at any time after the contact. The information is then processed by the discriminator and treated as described in alternative 1 or alternative 2.

I suggest to assemble the transmitting end in my station (AM MODE). I would prefer partners in Europe who have access to medical centers and a technical background.

I would appreciate any comments, and volunteers to assist with this project.

COMPUTER PRINTOUTS AVAILABLE FOR TRACKING AZIMUTH-ELEVATION

by William D. Johnston, WB5CBC

There is considerable literature available pointing out the advantages of tracking OSCAR in both azimuth and elevation, and still more literature describing the construction of antenna rotating systems to carry this out.¹ The use of such a system for satellite communications will not only result in more consistent and more readable communications, but will permit maximum use of the satellite for any given orbit. Once this antenna system is built, however, pointing it in the right direction is no easy matter if one is to go simply by guesswork.

The easiest method is with the use of a computer printout which shows both azimuth and elevation angles at given increments of time (every two minutes, for example), for each available orbit. Unfortunately, the cost of running a highly accurate orbital prediction program (\$5 per minute and up) has in the past made the cost of this method prohibitive to most hams.

Nevertheless, we can take advantage of several fortunate circumstances that permit any ham to have a printout for his station that will provide usable data for a full year, at a cost of only a few dollars.

The first important fact is that many university computing centers and research institutes sell computer time to individuals and non-profit organizations at a fraction of the commercial rate. Second is the fact that OSCAR 6 is in a highly stable orbit, which means that the orbital prediction program can supply data for orbits far into the future with no loss of accuracy. Furthermore, this satellite has a repeating period of 263 orbits, which means that the azimuth and elevation angles are the same every 263 orbits. Consequently, a reference table of 263 orbits can be referred to for a long time into the future.

If that weren't enough in itself, 263 orbits just happen to come out to exactly 21 days. This means that the repeating orbit with the same azimuth and elevation angles will come at the same time of the day, on the same weekday, three weeks later!

Therefore, if provided with a printout of AZ-EL data for all available orbits for 21 consecutive days, the same data can be used over and over, every three weeks, without the expenses of rerunning the orbital prediction program.

Actually, the repeating period is not *precisely* 263 orbits, and 263 orbits are not equal to precisely 21 days. But the error is so small that after several months the time is off by only 6 or 8 minutes, which is easy to correct for, and the angles are off no more than 4 or 5 degrees, which is less than the backlash in most amateur rotators.

¹See, for example, "Elevation--How Important Is It?," Wally Lamb, *AMSAT Newsletter*, June 1973, and "A Simple Az-El Antenna System for Oscar," Katashi Nose, *QST*, June 1973.

Arrangements have been made to provide data for interested amateurs at a cost of only \$2.50 plus a large self-addressed stamped envelope. (Stations outside the U.S. do not need to send the stamped envelope. See below for the total cost, which includes postage.) The price includes a computer printout of all available orbits for a reference period of 21 days. This 21-day reference printout will be generated so that it will begin about the time you receive it in the mail. Figure 1 shows a small extract from a typical printout. Note that the range to the satellite is also shown.

WB5CBC 15 SEP 73 (258) ORBIT 4188				
GMT	AZ	EL	R	
H M S	DEG	DEG	KM	
3:01:43	155	0	4531	
3:03:43	154	7	3826	
3:05:43	153	16	3134	
3:07:43	150	27	2481	
3:09:43	144	44	1918	
3:11:43	119	67	1556	

etc.

Figure 1--Extract from an actual reference-orbit printout. Dates and times are GMT.

In order to receive the data, you will need to send the following:

1. Name and mailing address.
2. Latitude (indicate North or South) and longitude (East or West), as accurately as possible, in degrees, minutes, and seconds. If you cannot find this information, give the name of the town where your station is located. If under 10,000 population, or if a rural area, carefully describe the location with respect to other nearby larger towns.
3. Altitude above sea level (indicate feet or meters).
4. A self-addressed stamped envelope, 9" by 12" or larger. (The envelope is not required of stations outside the U.S.) This envelope should bear sufficient postage for 6 ounces (48¢ for First Class, or 66¢ for Air Mail).

5. Payment as follows:

U.S.A.: (All locations with U.S.A. ZIP Code) \$2.50. (Don't forget the SASE as per item 4 above.)

Canada and Mexico: (No envelope required), The total cost is \$3.00 for First Class Mail or \$3.20 for Air Mail, which includes postage.

All other locations: (No envelope required), The total cost is \$3.50, which includes postage for Air Mail delivery. Surface mail is not recommended.

Payment should be in U.S., Canadian, or Mexican funds, and may be in the form of a personal check, money order (bank, postal, international, etc.), international bank draft, etc.

Send the above to:

Bill Johnston, WB5CBC
1808 Pomona Dr.
Las Cruces, New Mexico 88001

OSCAR 6 ORBITS

The following data for OSCAR 6 are supplied by AMSAT. The times are in GMT and the Longitudes are in degrees west of Greenwich.

Period : 114.99455 Minutes

Longitude Increment : 28.7487° per orbit.

Note that orbits repeat on a 263-orbit cycle every three weeks (i.e., every 21 days,) but 3.6 minutes later and 0.9 degrees further west.

REV	DATE	TIME Z	LONG W
4012	SEPT 1	0147.8	74.5
4024	SEPT 2	0047.8	59.5
4037	SEPT 3	0142.7	73.3
4049	SEPT 4	0042.6	58.2
4062	SEPT 5	0137.6	72.0
4074	SEPT 6	0037.5	57.0
4087	SEPT 7	0132.4	70.7
4099	SEPT 8	0032.4	55.7
4112	SEPT 9	0127.3	69.4
4124	SEPT 10	0027.2	54.4
4137	SEPT 11	0122.2	68.1
4149	SEPT 12	0022.1	53.1
4162	SEPT 13	0117.0	66.8
4174	SEPT 14	0017.0	51.8
4187	SEPT 15	0111.9	65.6
4199	SEPT 16	0011.8	50.5
4212	SEPT 17	0106.7	64.3
4224	SEPT 18	0006.7	49.3
4237	SEPT 19	0101.6	63.0
4249	SEPT 20	0001.5	48.0
4262	SEPT 21	0056.5	61.7
4275	SEPT 22	0151.4	75.4
4287	SEPT 23	0051.3	60.4
4300	SEPT 24	0146.3	74.2
4312	SEPT 25	0046.2	59.1
4325	SEPT 26	0141.1	72.9
4337	SEPT 27	0041.1	57.9
4350	SEPT 28	0136.0	71.6
4362	SEPT 29	0035.9	56.6
4375	SEPT 30	0130.9	70.3

4387	OCT 1	0030.8	55.3
4400	OCT 2	0125.7	69.0
4412	OCT 3	0025.7	54.0
4425	OCT 4	0120.6	67.8
4437	OCT 5	0020.5	52.7
4450	OCT 6	0115.5	66.5
4462	OCT 7	0015.4	51.5
4475	OCT 8	0110.3	65.2
4487	OCT 9	0010.2	50.2
4500	OCT 10	0105.2	63.9
4512	OCT 11	0005.1	48.9
4525	OCT 12	0100.0	62.6
4538	OCT 13	0055.0	76.4
4550	OCT 14	0054.9	61.3
4563	OCT 15	0149.8	75.1

REV	DATE	TIME Z	LONG W
4575	OCT 16	0049.8	60.1
4588	OCT 17	0144.7	73.8
4600	OCT 18	0044.6	58.8
4613	OCT 19	0139.6	72.5
4625	OCT 20	0039.5	57.5
4638	OCT 21	0134.4	71.2
4650	OCT 22	0034.4	56.2
4663	OCT 23	0129.3	69.9
4675	OCT 24	0029.2	54.9
4688	OCT 25	0124.2	68.7
4700	OCT 26	0024.1	53.6
4713	OCT 27	0119.0	67.4
4725	OCT 28	0019.0	52.4
4738	OCT 29	0113.9	66.1
4750	OCT 30	0013.8	51.1
4763	OCT 31	0108.7	64.8

4775	NOV 1	0008.7	49.8
4788	NOV 2	0103.6	63.5
4800	NOV 3	0003.5	48.5
4813	NOV 4	0058.5	62.2
4826	NOV 5	0153.4	76.0
4838	NOV 6	0053.3	61.0
4851	NOV 7	0148.3	74.7
4863	NOV 8	0048.2	59.7
4876	NOV 9	0143.1	73.4
4888	NOV 10	0043.1	58.4
4901	NOV 11	0138.0	72.1
4913	NOV 12	0037.9	57.1
4926	NOV 13	0132.9	70.9
4938	NOV 14	0032.8	55.8
4951	NOV 15	0127.7	69.6
4963	NOV 16	0027.7	54.6
4976	NOV 17	0122.6	68.3
4988	NOV 18	0022.5	53.3
5001	NOV 19	0117.4	67.0
5013	NOV 20	0017.4	52.0
5026	NOV 21	0112.3	65.7
5038	NOV 22	0012.2	50.7
5051	NOV 23	0107.2	64.4
5063	NOV 24	0007.1	49.4
5076	NOV 25	0102.0	63.2
5088	NOV 26	0002.0	48.1
5101	NOV 27	0056.9	61.9
5114	NOV 28	0151.8	75.6
5126	NOV 29	0051.8	60.6
5139	NOV 30	0146.7	74.3

REV	DATE	TIME	Z	LONG	W
5151	DEC	1	0046.6	59.3	
5164	DEC	2	0141.6	73.0	
5176	DEC	3	0041.5	58.0	
5189	DEC	4	0136.4	71.8	
5201	DEC	5	0036.4	56.7	
5214	DEC	6	0131.3	70.5	
5226	DEC	7	0031.2	55.5	
5239	DEC	8	0126.2	69.2	
5251	DEC	9	0026.1	54.2	
5264	DEC	10	0121.0	67.9	
5276	DEC	11	0020.9	52.9	
5289	DEC	12	0115.9	66.6	
5301	DEC	13	0015.8	51.6	
5314	DEC	14	0110.7	65.3	
5326	DEC	15	0010.7	50.3	

REV	DATE	TIME	Z	LONG	W
5339	DEC	16	0105.6	64.1	
5351	DEC	17	0005.5	49.0	
5364	DEC	18	0100.5	62.8	
5376	DEC	19	0000.4	47.8	
5389	DEC	20	0055.3	61.5	
5402	DEC	21	0150.3	75.2	
5414	DEC	22	0050.2	60.2	
5427	DEC	23	0145.1	73.9	
5439	DEC	24	0045.1	58.9	
5452	DEC	25	0140.0	72.7	
5464	DEC	26	0039.9	57.7	
5477	DEC	27	0134.9	71.4	
5489	DEC	28	0034.8	56.4	
5502	DEC	29	0129.7	70.1	
5514	DEC	30	0029.7	55.1	
5527	DEC	31	0124.6	68.8	

LETTERS

Dear Sir:

I wish to apologize for any distress I may have caused anyone in my recent letter that was published in the Newsletter (Vol. IV, No. 4, Dec. '72). It was a case of me writing before thinking, as I was able to use the satellite on certain occasions to see if I could get a signal through it, which I did, so I guess I had no reason to complain.

I wish to thank AMSAT in their efforts as I realize the amount of work and time to get such a project going must be tremendous. The amount of financial support provided by the dues appears to be just a small part of the money, time and equipment donated by the various groups world-wide. We should be thankful that there are individuals who are willing to work on the project so that amateurs may get the chance to enjoy the benefits of satellite communications.

In the future I will attempt to refrain from getting too "carried away" in my correspondence and channel my energies in the areas of perfecting my operating technique, which is apparently not up to par for satellite communications.

Jerome C. Grokowsky, WA9HCZ

La Crosse, Wisconsin
April 2, 1973

Dear Sir:

I heard some talk about plans or suggestions to put a future satellite in a synchronous "stationary" orbit. It sounds great; but it is my opinion that if such a satellite were made available for general use, it would become virtually useless. Imagine a 2M "repeater" available to anyone on two or three continents! QRM would be unbelievable. It could be expected that, aside from regular QSOs, many nets, phone patches and schedules would try to move in to take advantage of a circuit not affected by propagational vagaries.

Present OSCAR communication demands a great deal of expertise in tracking, operating, use of non-standard antennas and equipment. This makes OSCAR communication an exciting game. A stationary satellite would allow anyone to use it without effort.

In spite of above mentioned drawbacks, there is a dire need for such a satellite; not for "regular" use, however, but for emergency communications, especially with remote and isolated areas.

The problem is: how to police the use of an "emergency" satellite?

Possibly an international agreement can be arranged to restrict its use to emergency purposes only, where only authorized (specially licensed) stations would be allowed to communicate (for equipment test purposes) in non-emergency conditions.

K. J. Deskur, K2ZRO

Endicott, N.Y.
received April 12, 1973

Dear Sir:

I suggest specifying an emergency calling frequency for use with A-O-C. The life-saving possibilities for persons in remote areas, mountain climbers, explorers, and hikers is apparent. Government and public reaction the first time life is saved ought to be particularly favorable.

What are your thoughts?

Edward A. Johnson, K1IXT
Lowell, Massachusetts
May 24, 1972

Dear Sir:

I suggest that the Board of Directors and the Amateur Satellite Service Committee give consideration to having two or more satellites that make use of the same ground communications equipment. By this I mean rather than have one satellite that uses a 144 to 432 MHz repeater and then have the next one have a 432 to 144 MHz repeater, have two in a row with the same input/output. This would allow more test data and more kinds of tests to be run than by each satellite being one of a kind.

My other comment has to do with education and publicity for AMSAT. To begin with, I think AMSAT could probably convince the ARRL to scan through their past issues for articles that deal with OSCARS, tracking antennas, orbital tracking information, and other related space communications subjects. After having reprints made of these articles, they could offer them via QST as a packet. This could provide a beginning for newcomers' libraries.

Most of this material need not be in great detail, just some good basic information to get an amateur started off on the right path. Should the subject matter prove too great for one small pamphlet, then possibly two or three pamphlets could be published if the basic one has the appeal that I think it would. The education value and the flow of information both to and from AMSAT could do a lot to increase interest in Amateur Satellite Communications and bring many new members into AMSAT. It goes without saying that AMSAT would receive a lot of publicity and probably some financial gains could be realized that could aid in future projects. The idea is not to get AMSAT into the publishing business, but to do this on a small scale on the order of the newsletter.

Robert W. P. Patterson K5DZE/4
CPT U.S. Army
Columbus, Georgia
January 25, 1973

Editor's Note: A reprint booklet from QST and the AMSAT Newsletter is now available. See "Minutes of Amateur Satellite Service Committee Meeting," in this issue. Called "Member's Guide to Amateur Satellites," it is available from ARRL Headquarters, Newington, Connecticut 06111 on request upon receipt of a 16¢-stamped, self-addressed 6" x 9" envelope.

Dear Sir:

In the past six months I believe that most of us that are users of OSCAR 6 have experienced a period of accelerated education or re-education. Quite a few subjects we studied in school, both scholastic and technical, have been brought into play. We have seen in action the laws of the physical sciences that we burned the midnight oil cramming into our heads.

Our mathematics and algebra have suddenly become very important to us in the calculation of orbital data and time computation. An object that travels 15,000 miles per hour leaves little room for mathematical error. We begin to pay more attention to propagation forecasts because, as we have observed, an unsettled condition at the high end of the HF band is not conducive to good downlink performance. Our antenna construction takes on a new approach. Such antennas as crossed yagis and helical beams are very commonplace today in practice where before they were only textbook illustrations for most of us. We have become proficient in the use of automatic-gain-control with satellite signals, which before was a hit or miss proposition when copying ionospheric reflection.

All in all, I believe there has been no other event in this century that has stimulated such aggressive learning as the launching of the AMSAT OSCAR 6 Amateur Radio Satellite.

Dave Clingerman
W6OAL - KH6HQX - MP4BDU
Oakview, California
received April 5, 1973

Dear Sir:

Included are several communication reports of OM Standa OK1MBS, President of OK7ULZ VHF GROUP - No. A039, Karel OK1BMW and SWL reports of Mirek OK1FF, one of the foremost DX-men in our country.

We are very pleased to have the possibility to be one of many members of AMSAT, to participate in its activities and to get your AMSAT Newsletter. All hams here in OK land are regularly informed about OSCAR 6 in "Radio-amatersky zpravodaj," where many informations from AMSAT Newsletter are reprinted. For this purpose your sending of some pictures - photos of OSCAR 6 - technical details - suitable for reprint in our RZ-Newsletter will be highly appreciated.

This year we want to make some RTTY QSOs through OSCAR repeater too, after finishing all home-made equipment for it.

Vladimir K. Holena, OK1ALV
Public Relations Manager
OK7ULZ VHF GROUP
AMSAT No. A039
Prague, Czechoslovakia
February 10, 1973

LONELY VOICE

I have the OSCAR completely to me and none to share. Though my S-meter peaks 20-dB above 59 on an overhead pass, my QSO's are equally with none. The "Lonely Voice" from VU2-land originates at 12.98 degrees North, 282.33 degrees West (QTH, Bangalore,) and a QSO will bring more points for the "OSCAR 1000" Award. VU2TV looks for stations east of 282 degrees in the mornings, and west at nights (local time). If you work VU2TV, please QSL direct and give your address to receive the QSL by air mail.

73.

V. Subramanian, VU2TV
159/1 Silver Oak Avenue
Eq. TRG. COMMD.
Hebbal, Bangalore 560006, India

August 16, 1973

SPECIAL ANNOUNCEMENT - RENAMING OF OSCAR 6

With the reaching of the first birthday of OSCAR 6 and the successful operation of this first satellite of the AMSAT-OSCAR-B series, the AMSAT Board of Directors is considering redesignating the satellite officially as "OSCAR 6/AMSAT-1", more simply AMSAT-1. Your comments on the proposed new designation are welcome. If decided upon, the new name would be effective on OSCAR 6's first anniversary, October 15.

Please indicate whether you favor the idea in the space provided at the bottom of the tear-out sheet bound into the center of this newsletter.